ABSTRACT

A frequency synthesizer, a calibrator thereof, and an operating controller thereof are described. The synthesizer comprises a main charge pump that drives a voltage controlled oscillator (VCO) through a loop filter. The calibrator includes a second, replica charge pump that can also drive the VCO, but is set up to output only its maximum or minimum analog output control voltage. Since the construction and characteristics of the replica charge pump duplicate the main charge pump, the main charge pump's minimum and maximum analog control outputs can be cloned out to the VCO on demand. A VCO calibration procedure therefore includes switching the VCO to each of its ranges set by a bank of fixed capacitors, and using the replica charge pump to drive the VCO to its minimum and maximum frequency for each range setting. The min-max frequency data is stored in a lookup table, and operational requests to switch to a new channel frequency can be supported with a priori information about which fixed-capacitor range selection will be best. The operating point controller includes a sensor to sense the operating point and a controller that provides a switching input to a switchable bank of capacitors to change the operating point. The change can be determined according to calibration data.